

REMARKS

Claims 1-36 are pending in the present application and were examined. Claims 1-36 are rejected. The specification and drawings are objected to by the Examiner. In response, Claims 1-8, 11, 13, 14, 21, 26, and 34 are amended, Claims 10, 20, 22, 23, 27, 28, and 31-33 are cancelled and no claims are added. Applicant respectfully requests reconsideration of pending Claims 1-36 in view of at least the following remarks.

I. Objections to the Drawings

The drawings are objected to under 37 CFR 1.83(a). Regarding FIG. 9, a replacement sheet is provided for FIG. 9 such that process block 550 of FIG. 9 now reads “hoist instructions no longer detected from identified motion candidate instructions.” Similarly, process block 579 of FIG. 12 is amended to recite “sink instructions no longer detected from identified motion candidate instructions.”

Replacement sheets are also provided for FIGS. 11 and 13 to indicate that hoisting and sinking of corresponding hoisting/sinking instructions are performed into a corresponding predecessor/successor basic blocks. Similar changes are provided with the replacement sheets 14 and 16. A replacement sheet is also provided for FIG. 5 to correctly refer to “boundary instructions” as in Claims 1, 11, and 35. In view of the replacement sheets provided, Applicants respectfully request that the Examiner reconsider and withdraw the objection to the drawings under 37 CFR 1.83(a).

II. Objections to the Specification

The disclosure is objected to because of informalities. In response, page 4, para. 20 of the Applicant’s specification is amended to refer to FIG. 15 see as follows:

FIGS. 15A-15C are block diagrams, illustrating computation of motion candidates, in accordance with one embodiment of the invention.

Furthermore, Applicant’s specification as filed refers to FIGS. 15A-15C at page 16, para. 64. In view of Applicant’s amendment to the specification, Applicants respectfully request that the Examiner reconsider and withdraw the objection to the specification.

III. Objections to the Claims

Claims 1, 11, 32 and 35 are objected to because of informalities. In response, Claims 1, 11, and 35 are amended to replace reference to bounding instructions with “boundary instructions” to provide antecedent basis for such boundary instructions. (See replacement sheet for FIG. 5.) In addition, Claim 35 is amended as suggested by the Examiner. In view of Applicant’s amendments to Claims 1, 11, and 35, Applicants respectfully request that the Examiner withdraw the objection to Claims 1, 11, and 35-36.

IV. Claim Rejections Under 35 U.S.C. §112

Claims 3-9, 13-19, 33 and 36 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which application regards as the invention.

In response, Claims 3-9, 13-19, and 36 are amended as previously referred to in the objection to the drawings with regard to replacement sheets for FIGS. 9, 11-14, and 16. As indicated in the changes to the figures, hoisting of detected hoist instructions from motion candidate instructions is performed to corresponding predecessor basic blocks. In addition, sinking of detected sink instructions from the identified motion candidates is performed into corresponding successor basic blocks.

Similarly, process blocks 552 of FIG. 9 and 576 of FIG. 12 are amended to indicate that motion candidate instructions are reordered within the basic blocks of the CFG loop, which refers to a type of intra-block hoisting/sinking of motion candidate instructions, as shown. For example, Claims 3 and 8 recite “reordering of the identified motion candidate instructions within basic blocks that contain await instruction based on a data dependence graph of a sequential application program.”

In view of Applicant’s amendments to the above claims, as well as the providing of replacement sheets for FIGS. 9, 11-14, and 16, Applicants respectfully submit that Claims 3-9, 13-19, and 36 particularly point out and distinctly claim the subject matter which Applicants regards as the invention. Consequently, in view of such amendments to the Applicant’s

specification, claims, and drawings, Applicants respectfully request that the Examiner reconsider and withdraw the 35 U.S.C. §112, second paragraph rejection of Claims 3-9, 13-19 and 36.

V. Claim Rejections Under 35 U.S.C. §102

Claims 1 and 11 are rejected under 35 U.S.C. §102(b) as being anticipated by Gupta et al, (U.S. Patent No. 6,044,221) (“Gupta”). Applicants respectfully disagree with the Examiner’s assertions and characterizations of the cited reference, and therefore traverse this rejection of Claims 1 and 11.

Claim 1 recites:

1. A method comprising:
building a control flow graph (CFG) for a loop body of a sequential application program to form a CFG loop;
updating nodes of the CFG loop to enclose identified critical sections of the sequential application program within pairs of boundary instructions; and
forming a plurality of application program thread partitions from a modified CFG loop wherein nodes of the CFG loop are modified to reduce an amount of instructions between corresponding pairs of boundary instructions to form the modified CFG loop; and
synchronizing sequential execution of the identified critical sections among concurrently executing application program threads to ensure that the identified critical sections among the concurrently executing application program threads are executed in a sequential thread order. (Emphasis added.)

Gupta is generally directed to optimizing code based on resource sensitive hoisting and sinking where code is optimized using resource based partial elimination techniques to eliminate dead code as well as partially dead code. (See Abstract and col. 1, lines 13-51.) In contrast with Claim 1, Gupta does not disclose or suggest forming a plurality of application program threads from a modified CFG loop, wherein nodes of the CFG loop are modified to reduce an amount of instruction between corresponding pairs of boundary instructions to form the modified CFG loop, as in Claim 1. Gupta does disclose beneficial sinking of statements across loop boundaries (see col. 12, lines 45-54), however, that is something completely different from forming a plurality of application program threads from a modified CFG loop wherein nodes of the CFG loop are modified to reduce an amount of instructions between corresponding pairs of boundary instructions to form the modified CFG loop, as in Claim 1.

Furthermore, in contrast with Claim 1, Gupta does not disclose or suggest synchronizing execution of the identified critical sections of the concurrently executing application program threads to ensure that the identified critical sections are executed in a sequential thread order, as in Claim 1. (See Applicant's specification, pg. 8, para. 0043.) The Examiner has not identified and Applicants are unable to discern any disclosure, teaching, or suggestion regarding synchronizing execution of the identified critical sections of the concurrently executing application program threads to ensure that the identified critical sections are executed in a sequential thread order, as in Claim 1. We submit that neither col. 12, lines 45-55 nor any other disclosure of Gupta teaches or suggests synchronizing execution of the identified critical sections of the concurrently executing application program threads to ensure that the identified critical sections are executed in a sequential thread order, as in Claim 1.

For each of the above reasons, Claim 1, and all claims which depend from Claim 1, are patentable over the cited art. Therefore, Applicant respectfully requests that the Examiner reconsider and withdraw the §102(b) of Claim 1.

Independent Claim 11 recites similar claim features to those highlighted above with reference to Claim 1. Therefore, Claim 11 is also patentable over the cited art for similar reasons. Consequently, Applicant respectfully requests that the Examiner reconsider and withdraw the §102(b) of Claim 11.

Claims 21-32, 34-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Sohi et al, "Multiscalar Processors", 1995, ACM 0-89791-698; pp. 414-425 ("Sohi"). Applicants respectfully disagree with the Examiner's assertions and characterizations of the cited reference, and therefore traverse this rejection.

Claim 21 recites:

21. A method comprising:
partitioning a sequential application program into a plurality of application program threads according to a thread count of a multi-threaded architecture; and
concurrently executing the plurality of application program threads within a respective thread of a multi-threaded architecture; and
synchronizing access to identified critical sections of the sequential application program among the plurality of application program threads

execute critical sections of the thread program loop in sequential thread order.
(Emphasis added.)

Sohi is generally directed to multi-scalar processors and describes the philosophy of the multi-scalar paradigm, the structure of multi-scalar programs, and the hardware architecture of a multi-scalar processor. In contrast with Claim 21, Sohi does not disclose or suggest synchronizing access to identified critical sections of a sequential application program among a plurality of concurrently executing application program threads to ensure that the identified critical sections are executed in a sequential thread order, as in Claim 21. Sohi does disclose establishment of a large and accurate dynamic window of instructions from which independent instructions can be extracted and scheduled for parallel execution (see page 415, first paragraph under section 2.1), however, synchronizing access to identified critical sections of a sequential application program among a plurality of application program threads to ensure that critical sections of a thread program loop are executed in a sequential thread order, as in Claim 21.

Hence, neither section 2.1, section 2.2, nor any other disclosure of Sohi discloses or suggests synchronizing access to identified critical sections of a sequential application program among a plurality of concurrently executing application program threads to ensure that critical sections of thread program loops are executed in a sequential thread order, as in Claim 21.

For each of the above reasons, therefore, Claim 21 and all claims which depend from Claim 21 are patentable over the cited art.

Each of Applicant's other independent claims include features similar to those highlighted above in Claim 21. Therefore, all of Applicant's other independent claims, and all claims which depend on them, are also patentable over the cited art for similar reasons.

VI. Claim Rejections Under 35 U.S.C. §103

Claims 2-10 and 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta in view of APA, and further in view of Sohi. In addition, Claims 33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sohi in view of Gupta.

DEPENDENT CLAIMS

In view of the above remarks, a specific discussion of the dependent claims is considered to be unnecessary. Therefore, Applicant's silence regarding any dependent claim is not to be interpreted as agreement with, or acquiescence to, the rejection of such claim or as waiving any argument regarding that claim.

PETITION FOR EXTENSION OF TIME

Per 37 C.F.R. 1.136(a) and in connection with the Office Action mailed on July 23, 2007, Applicant respectfully petitions Commissioner for a one (1) month extension of time, extending the period for response to November 23, 2007. Please charge Deposit Account 02-2666 in the amount of \$120.00 to cover the petition filing fee for a 37 C.F.R. 1.17(a)(3) large entity.

CONCLUSION

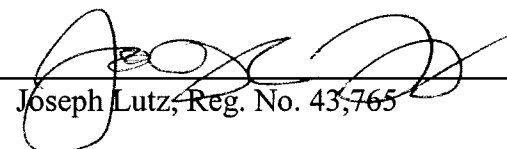
In view of the foregoing, it is submitted that Claims 1-36, as amended, patentably define the subject invention over the cited references of record, and are in condition for allowance and such action is earnestly solicited at the earliest possible date. If the Examiner believes a telephone conference would be useful in moving the case forward, he is encouraged to contact the undersigned at (310) 207-3800.

If necessary, the Commissioner is hereby authorized in this, concurrent and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2666 for any additional fees required under 37 C.F.R. §§1.16 or 1.17, particularly, extension of time fees.

Respectfully submitted,

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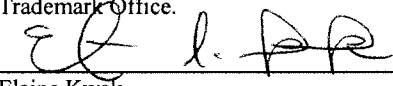
Dated: 10/25/07

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CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being submitted electronically via EFS Web on the date shown below to the United States Patent and Trademark Office.


Elaine Kwak

10/25/07
Date